Arcs and circles--continued!

In this lesson our learning objective is to complete our list of circle properties and learn how to apply those properties to solve problems. In addition we will explore the equation of a circle in the coordinate plane.

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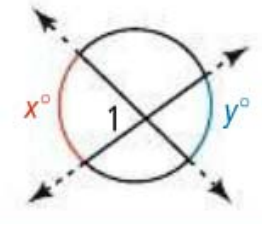
Theorem 12-13

The measure of an angle formed by two lines that intersect inside a circle is half the sum of the measures of the intercepted arcs.



$$m\angle 1 = \frac{1}{2}(x + y)$$

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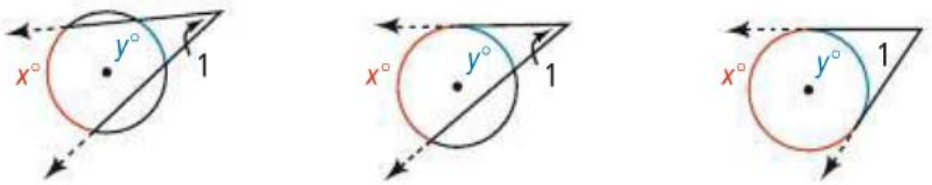
Theorem 12-14



The measure of an angle formed by two lines that intersect outside a circle is half the difference of the measures of the intercepted arcs.

$$m\angle 1 = \frac{1}{2}(x - y)$$

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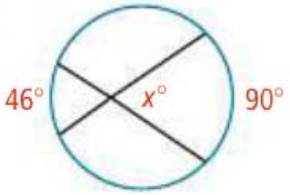
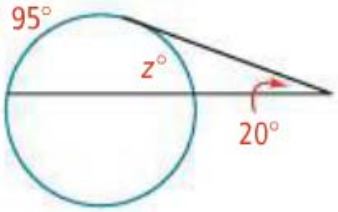
Examples

1. What is the measure of angle x?



2. What is the measure of arc z?



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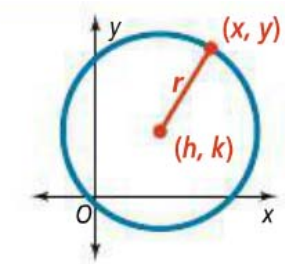
Circles in the coordinate plane



Theorem 12-16

The equation of a circle with center at point (h,k) and radius r is $(x-h)^2 + (y-k)^2 = r^2$

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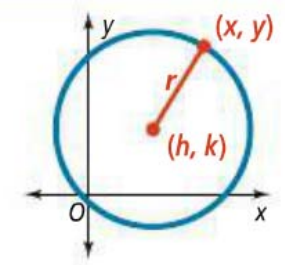

$(x-h)^2 + (y-k)^2 = r^2$

Center at (3,4):

$(x-3)^2 + (y-4)^2 = r^2$

Center at (-2,-5):

$(x+2)^2 + (y+5)^2 = r^2$

Note that the offset from the origin is subtracted from x and y in this equation! So we subtract positive offsets (right or up) and "add" (subtract a negative) negative offsets (left or down).

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Example

Suppose the equation to the right represents the coverage area for a cell phone tower. How would we graph it?

$$(x-7)^2+(y+2)^2=64$$

1. Where is the center?

2. What is the radius?

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Example (continued)

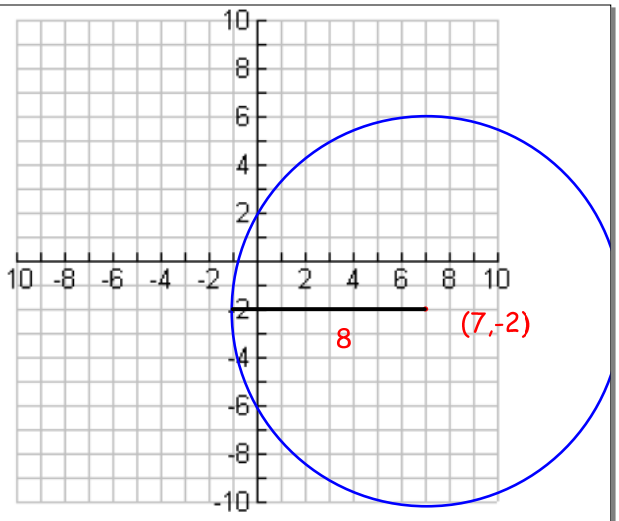
$$(x-7)^2+(y+2)^2=64$$

1. Where is the center?

Point (7,-2).

2. What is the radius?

The radius is 8.



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1. What is the equation of a circle with a center at (-1,2) and radius 4.

Equation: $(x+1)^2+(y-2)^2=4^2$

2. What is the equation of a circle with a center at (2,3) and radius 2

Equation: $(x-2)^2+(y-3)^2=2^2$

3. What is the equation of a circle with a center at (-4,3) and radius 5

Equation: $(x+4)^2+(y-3)^2=5^2$

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1. Draw a circle with a center at (-1,2) and radius 4.

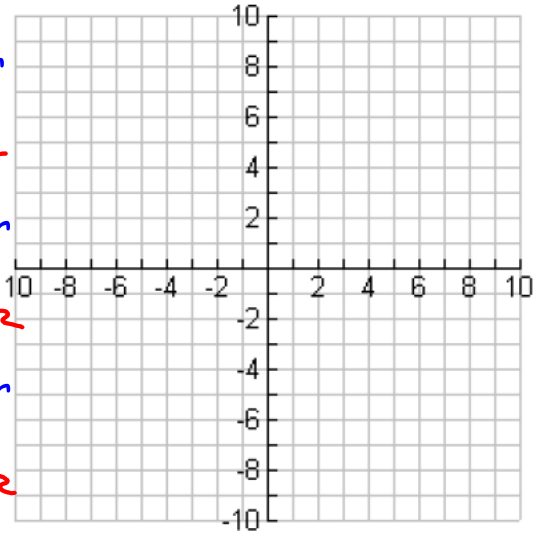
Equation: $(x+2)^2+(y-2)^2=4^2$

2. Draw a circle with a center at (2,3) and radius 2

Equation: $(x-2)^2+(y-3)^2=2^2$

3. Draw a circle with a center at (-4,3) and radius 5

Equation: $(x+4)^2+(y-3)^2=5^2$



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